

# **PROCESS AND DEVICE FOR DISCHARGING LIGNOCELLULOSE RAW MATERIALS FROM A DIGESTER AND CONVEYING THE RAW MATERIAL TO A REFINER**

## **Background of the Invention**

5           The present invention relates to a process and a device for discharging lignocellulose raw materials, especially wood chips, saw dust, annual plants or wood waste, from a digester and for conveying the raw material to a refiner.

10           It is known that in the digestion of lignocellulose raw materials, the digested material is conveyed by a discharge screw and under pressure, and by a further feed screw into a pressurized refiner.

15           Such devices are, for instance, known from GB 658 104. Here, in an intermediate conveyor screw, the wood chips are pressed and the hot cooking liquor is returned to the digester, in order to utilize the heat content. However, a considerable part of the cooking liquor and also foreign matters adhering to the wood chips are nevertheless conveyed into the refiner and subsequently, into the dryer.

20           For the purpose of the present application, all pipes, ducts, and devices connecting the digester and the refiner are subsumed under the term "connection device".

          In the refiner, lignocellulose raw materials, for instance, wood chips, are defiberized. This pulp is then transported to a dryer via a blow duct, and in the dryer, the fibers are dried to a residual moisture of approx. 10% b. d.

25           One disadvantage of this known process consists in the fact that due to the high amount of liquid adhering to the wood chips, a high dryer capacity is needed. Another problem consists in controlling the emissions created by drying.

### Summary of the Invention

The present invention has the objective of making a process and a device available that overcomes the above drawbacks of conventional technology.

5           The present invention is based on the lignocellulose raw materials, especially wood chips, saw dust, annual plants or wood waste, being dewatered between the digester and the refiner, especially to compact the materials, and to eliminate the resulting condensate from the process. This reduces the moisture content in the wood chips, so  
10           that the dryer downstream of the refiner consumes less thermal energy for drying the fibers.

          In addition, together with the condensate from dewatering, especially compaction, of the lignocellulose material, for instance wood chips, wood ingredients can be eliminated from the process, positively  
15           influencing the emissions from the dryer. With this feature savings can be achieved in the investment for exhaust gas cleaning plants.

          It has been shown that the condensate eliminated from the process can be used in glue preparation, because the wood ingredients in the condensate have a favorable influence on the glue, depending on  
20           the process.

          Therefore, a preferred embodiment of the present invention also refers to re-use of the condensate eliminated in the production of size.

          Preferably, the compaction of the wood chips can be achieved with a plug screw at the digester discharge, i.e. by a screw whose cross  
25           section diminishes in the direction of transport.

          A screen section is advantageously provided around the circumference or parts of the circumference of this screw, through which screen the liquid (condensate) adhering to the wood chips is being squeezed out.

### **Brief Description of the Drawings**

The present invention may be better understood and its numerous objects and advantages will become apparent to those skilled in the art by reference to the accompanying drawings in which:

5           Figure 1 shows a schematic drawing of a system for transporting wood chips from a digester to the refiner, according to the present state of the art.

10           Figure 2 shows a schematic drawing of a preferred configuration of the process according to the invention, and of the device according to the invention.

### **Detailed Description of the Preferred Embodiment**

In Figure 1, wood chips are cooked in a manner that is basically known. The wood chips are fed to digester 1 via a plug screw 11. A non-return valve for steam 12 is provided at the digester.

15           At the end of the cooking process, the wood chips are fed to the refiner 3 via an agitator 21 provided at the digester discharge and a conventional discharge screw 23, which is powered via drive unit 22, via compensator 24 and a feed screw 26, which is also powered via a drive unit 25.

20           A steam compensation pipe 13 is provided between the digester 1 and feed screw 26.

The fibers produced in the refiner are fed from the refiner 3 powered by a drive unit 31 via a blow line 32 to a dryer (not shown).

25           In Figure 2, devices and parts of devices that are identical with those in the embodiment according to the state of the art and according to Figure 1 carry the same reference numerals.

In accordance with the preferred embodiment of the present invention shown in Figure 2, the conventional discharge screw 23 at the outlet from the digester is replaced by a plug screw 23'.

The wood chips are compacted in this plug screw 23', whose conveyance cross section decreases in the transport direction.

5 The liquid (condensate) resulting from this process is squeezed out through screens (not shown) and collected in a receptacle 27 while still under steam pressure. Subsequently, the condensate is discharged from the system through one or several sluices or relief valves 28 with potential back cooling for further use. The required dryer performance and also the environmental impact caused by the emissions are reduced considerably. The condensate can be used to manufacture glue  
10 preparation, because the wood ingredients in the condensate have a favorable influence on the glue, depending on the process.

A rotating peeling head 29 provided at the discharge from the plug screw further increases the homogeneity of the discharge toward the plug screw 26 and further to the refiner 3. The rotating peeling head 29  
15 continuously peels the cake formed by the dewatered wood chips similarly to a drill. The peeling head is preferably set against the cake of wood chips at a defined pressure and operated at a controlled rotational speed.

A steam condensation line 29a is furthermore provided between  
20 the plug screw 23' and the compensator 24.